Remarks

Applicants thank the Examiner for the careful examination of this application and the clear explanation of the rejections.

The new claims obviate the rejections under 35 USC 102 and 103. The new claims "particularly point out and distinctly claim the subject matter the applicant regards as his invention."

New claim 50 defines transmitter circuitry for a code division multiple access system.

Diversity control circuitry has a Doppler control signal input, a handoff signal input and a control output signal having a first state and a second state.

A space time transmit diversity circuit has a control input connected with the control output signal of the diversity control circuitry, a symbol input adapted to receive a series of symbol signals, a first antenna output, and a second antenna output.

The diversity circuitry, in response to the control output signal being in the first state, alternately connects the symbol signals on the symbol input to the first antenna output and the second antenna output. The diversity circuitry, in response to the control output signal being in the second state, effects space time transmit diversity by producing a symbol on the first antenna output and a transformed symbol on the second antenna output.

In contrast, the rejection refers to the following passage of US 6,259,749 to Andoh:

> Before proceeding with the description of a Viterbi decoder of the present invention, it is useful to explain a convolutional encoder with a constraint length 7 and a code rate 1/3 with reference to FIG. 1. The convolutional encoder comprises a six-stage shift register 1, modulo-2 adders 2, 3 and 4, and a parallel-to-serial converter 5. The input terminals of stages D1 to D4 and the output terminal of stage D6 of shift register 1 are connected to adder 2 to produce a first output pulse sequence by operating a generator polynomial "1111001" on an input pulse sequence supplied to the input of the shift register 1. The input terminals of stages D1, D3, D4, D6 and the output terminal of stage D6 are connected to adder 3 to produce a second output pulse sequence by operating a generator polynomial "1011011" on the input pulse sequence. A third output pulse sequence is produced by coupling the input terminals of stages D1, D3, D5 and the output terminal of stage D6 to adder 4 by operating a generator polynomial "1110101" on the input pulse sequence. The pulses of these output sequences are multiplexed in the parallel-to-serial converter 5 into convolutional codewords. Column 3, lines 18-38

The only place the Andoh patent mentions the word "transmit", according to a word search of the text, is in the Brief Description of the Drawings, as follows:

> FIG. 1 is a block diagram of a convolutional encoder used at the **transmit** end of a communication link for describing the Viterbi decoder of the present invention located at the receive end of the link; (bold text supplied)

The Andoh patent thus discloses an improved Viterbi decoder used at the receive link of a communications system. The Andoh patent fails to describe the claimed controls or diversity circuits of the transmit part of a code division multiple access communications system.

New claim 50 distinguishes over the Andoh patent with the limitations of the transmitter circuitry for a code division multiple access system, the

diversity control circuitry having a Doppler control signal input, a handoff signal input and a control output signal having a first state and a second state, and the space time transmit diversity circuit having a control input connected with the control output signal of the diversity control circuitry, a symbol input adapted to receive a series of symbol signals, a first antenna output, and a second antenna output, the diversity circuitry, in response to the control output signal being in the first state, alternately connecting the symbol signals on the symbol input to the first antenna output and the second antenna output, and the diversity circuitry, in response to the control output signal being in the second state, effecting space time transmit diversity by producing a symbol on the first antenna output and a transformed symbol on the second antenna output.

US 6,317,411 to Whinnett discloses:

With reference now to FIG. 5, there is depicted a system for transmitting signals from an antenna array using a transmit diversity technique in accordance with the method and system of the present invention. As shown, data source 20 provides a data stream of symbols, which may be encoded and interleaved. These symbols, shown as S.sub.1 through S.sub.4, are output at a rate determined by symbol clock 22.

The output of data source 20 is coupled to commutator 80, which, in this example, selects pairs of symbols that are output along branches 82 and 84 of the transmitter. Note that commutator 80 operates at one half of the rate of symbol clock 22, as shown by the output from divider 86. This means that the data rates along branches 82 and 84 are half the rate output from data source 20. Divider 86 divides by two because two symbols are selected for each branch. If any other number of symbols were selected for each branch, divider 86 would divide by the number of symbols selected.

Transformers 88 and 90 are coupled to the data streams output from commutator 80. Transformers 88 and 90 transform the pairs of symbols to produce two data streams that represent different mathematical combinations of the group of or symbols that was input into the transformer. The groups of symbols are transformed, or combined

mathematically, in such a way that they may be mathematically separated in the receiver using the measured channel coefficients.

In a preferred embodiment, transformers 88 and 90 are implemented with space-time coders, such as a space-time coder 60 described with reference to FIG. 3. In the example shown in FIG. 5, space-time coders 88 and 90 each output first and second space-time encoded data streams, which are then coupled to the input of spreaders 92 in branch 82 and spreaders 94 in branch 84. Spreaders 92 use the same spreading code, which is shown in FIG. 5 as the concatenation of W.sub.1 with W.sub.1. Spreaders 94 use another spreading code formed by concatenating W.sub.1 with the inverse of W.sub.1. The spreading codes selected for spreaders 92 and spreaders 94 are orthogonal to one another in the sense the signals in branches 82 and 84 may be separated from one another at the receiver.

The output of spreaders 92 and spreaders 94, which may be referred to as antenna data streams, are then modulated, up converted, amplified, and transmitted from a selected antenna element in an antenna array. The modulation and up conversion function are shown in FIG. 5 at modulator and up converters 96. Amplification is performed by amplifiers 98, which are coupled to antennas 100 through 106. Column 5, lines 9-49.

The Whinnett patent thus discloses source 20 constantly providing symbols alternatively to transformers 88 and 90. Transformer 88 receives even numbered symbols, for example, and transformer 90 receives odd numbered symbols. Each transformer then outputs on one lead the received symbols and on another lead a transform of the received symbols. The outputs from the transformers are then spread in multipliers 92, 94, up converted in converters 96, amplified and transmitted from antennas.

The Whinnett patent fails to describe the claimed controls or diversity circuits having different outputs in response to a control signal in a transmitter of a code division multiple access communications system.

New claim 50 distinguishes over the Whinnett patent with the limitations of the transmitter circuitry for a code division multiple access system, the diversity control circuitry having a Doppler control signal input, a handoff signal input and a control output signal having a first state and a second state, and the space time transmit diversity circuit having a control input connected with the control output signal of the diversity control circuitry, a symbol input adapted to receive a series of symbol signals, a first antenna output, and a second antenna output, the diversity circuitry, in response to the control output signal being in the first state, alternately connecting the symbol signals on the symbol input to the first antenna output and the second antenna output, and the diversity circuitry, in response to the control output signal being in the second state, effecting space time transmit diversity by producing a symbol on the first antenna output and a transformed symbol on the second antenna output.

US 6,373,831 to Secord discloses in Figure 5, an error correction encoder 10, interleaver 20, multiplexor 30, inverse-multiplexor 40, Walsh spreader 50, baseband pulse shaping filter 80 and frequency up-converter 90. The power control symbols may be multiplexed onto the data stream by puncturing out the encoded data bits. The power control symbols are then sent on any or all of the carriers with the user data. By "hopping" the power control symbols to different channels at different times, frequency diversity is achieved for the power control symbols as well.

The Secord patent fails to describe the claimed controls or diversity circuits having different outputs in response to a control signal in a transmitter of a code division multiple access communications system.

New claim 50 distinguishes over the Secord patent with the limitations of the transmitter circuitry for a code division multiple access system, the diversity control circuitry having a Doppler control signal input, a handoff signal input and a control output signal having a first state and a second state, and the space time transmit diversity circuit having a control input connected with the control output signal of the diversity control circuitry, a symbol input adapted to receive a series of symbol signals, a first antenna output, and a second antenna output, the diversity circuitry, in response to the control output signal being in the first state, alternately connecting the symbol signals on the symbol input to the first antenna output and the second antenna output, and the diversity circuitry, in response to the control output signal being in the second state, effecting space time transmit diversity by producing a symbol on the first antenna output and a transformed symbol on the second antenna output.

Claim 50 stands allowable.

Claim 54 defines transmitter circuitry for a code division multiple access system.

There are a first set of data symbol leads and a second set of data symbol leads.

There are space time transmit diversity circuits. Each diversity circuit has an input connected with one lead of the first set of data symbol leads and has a first output and a second output.

There are multiplier circuits. Each multiplier circuit has an input and an output. A first set of multiplier circuits has each of their inputs connected with the first output of one diversity circuit. A second set of multiplier circuits has each of their inputs connected with the second output of one diversity circuit. A third set of multiplier circuits has each of their inputs connected with one of the second set of data symbol leads.

First summation circuitry have plural inputs connected with the outputs of the first and third sets of multiplier circuits and an output.

A first antenna is connected with the output of the first summation circuitry.

Second summation circuitry has plural inputs connected with the outputs of the second set of multiplier circuits and an output.

A second antenna is connected with the output of the second summation circuitry.

Claim 54 distinguishes over the disclosures in the cited art with the limitations of the diversity circuits being connected to the first set of data symbol leads, the multiplier circuits being arranged in three sets with different connections for each set, and the summation circuitry having different connections.

Claim 54 stands allowable.

The application is in allowable form and the claims distinguish over the cited references. Applicant respectfully requests reconsideration or further examination of this application.

Respectfully Submitted,

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